

# Structured Multisensory Techniques in Reading and Learning Patterns - Some Considerations

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## Abstract

This study investigates whether a structured multisensory programme of early literacy' ('M-POW'R - Multisensory Programme of Writing and Reading (Muscat, unpublished early literacy programme) implemented in a Maltese private school is perceived by teachers using it as an inclusive strategy, as respectful of the learning modalities molding and shaping each learner's path through learning. This study makes use of the interactive learning model proposed by Johnston (1994, 1996, 2006, 2007 and 2009) and explores the extent this multisensory early literacy programme compliments the four learning patterns proposed in Johnston's theory. This research embraces and is underpinned by a number of philosophies and frameworks, namely the social model approach to disability and beyond (Barnes & Mercer, 1997; Barton & Oliver, 1997; Oliver, 1992; 1996), the Adams' Model of Reading (1990), Piagetian genetic epistemology (Schwebel & Raph, 1973), Vygotskian concept of scaffolding, (Steffe & Gale, 1995; Ormrod, 2007) and the concept of Universal Design Learning and Inclusive strategies (Falzon, 2010; Hegarty, 1993; Mengon & Hart, 1991; Pugach 1995; Tod, 1999; Rose & Meyer 2002; Turnbull, Turnbull & Wehmeyer, 2010). The data were collected through a questionnaire given to all nine teachers working with the Early Years of the school. Teachers unanimously perceived the multisensory programme as respectful of the four learning patterns to each of the 16 themes in the questionnaire. In line with the aims and ethos of the 'M-POW'R programme, the more predominant learning patterns were Technical and Sequential, followed by Confluence and Precision respectively. Statistical differences were only found in four themes. The confidence interval in this study is very high and therefore inference to the actual mean can be made. This study confirms that the structured multisensory

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techniques developed and designed by Muscat are inclusive strategies and respectful of the learners' individual learning preference.

**Keywords:** MPow'r, Multisensory techniques, Reading, Let Me Learn Process, Learning Patterns

## Resumen

Este estudio investiga si un programa estructurado multisensorial de alfabetización temprana (' M-POW'R - Programa Multisensorial de Escritura y Lectura (Muscat), puesto en práctica en una escuela privada maltesa, es percibido por los profesores que lo usan como una estrategia global, respetando el proceso personal del que aprende. Este estudio utiliza el modelo de estudio interactivo propuesto por Johnston (1994, 1996, 2006, 2007 y 2009) y analiza el grado de cumplimiento del programa según los cuatro patrones de aprendizaje propuestos en la teoría de Johnston.

Esta investigación se sustenta en diversas teorías filosóficas relativas a la discapacidad (Graneros y Mercer, 1997; Barton y Oliver, 1997; Oliver, 1992; 1996), el Modelo de Adán de Leer (1990), la epistemología genética de Piagetian (Schwebel y Raph, 1973), el concepto de estructura de Vygotskian, (Steffe y Viento fuerte, 1995; Ormrod, 2007) y el concepto de Estudio de Diseño Universal y estrategias Globales (Falzon, 2010; Hegarty, 1993; Mengon y Venado, 1991; Pugach 1995; Tod, 1999; Rosa y Meyer 2002; Turnbull, Turnbull y Wehmeyer, 2010).

Los datos fueron recogidos mediante un cuestionario pasado a los nueve profesores que trabajan en la etapa de primaria. Los profesores percibieron unánimemente que el programa respondía a las características de los cuatro patrones del modelo de Johnston en cada uno de los 16 ítems del cuestionario. Al igual que los objetivos y el carácter distintivo del programa M-POW'R, los patrones predominantes eran el Técnico y el Secuencial, seguidos del Confluyente y el Preciso respectivamente. Sólo fueron encontradas diferencias estadísticas en cuatro ítems. El intervalo de confianza en este estudio es muy alto y confirma que las técnicas estructuradas multisensoriales desarrolladas y diseñadas por el Muscat son estrategias globales y respetuosas con las características individuales de cada uno de los estudiantes.

## Introduction

It is common knowledge in the field of psychology that the motoric memory code is the most persistent and long term (Ormrod, 2007). Observing babies and little children, one can see that they access information, and therefore learning, through extensive use of their senses. Structured multisensory techniques and approaches to teaching build on these observations to help students access the curriculum, in this case reading and making sense of print. This approach is beneficial to all children, and particularly essential for dyslexic students. This pedagogy is essential if students are to have easy and effective access to the curriculum and to the written text.

The multisensory programmes and techniques to early literacy referred to in this paper have two common criteria, namely Universal Design Learning (UDL) and the social model approach and beyond. The social model approach (Oliver, 1992; 1996) emphasises the issue of accessibility and focusing on abilities and skills rather than on labeling and diagnosing and the multisensory approach to reading, with its characteristic features of structure and sequence, respects this philosophy. Universal Design Learning (e.g. Turnbull et al, 2010) embraces the concept of accessing information for all, helping all students learn to become independent, self reliant and self sufficient learners, and removes barriers to access to learning. Structured multisensory techniques and programmes do this with regard to early literacy and breaking the code to reading (Moats, 2000). Thus, such techniques are positive inclusive strategies and compliment techniques developed within the Process developed by Professor Christine Johnston and colleagues well, namely the Let Me Learn Process (Johnston, 2009). This process builds on knowledge of one's learning pathways captured by the Learning Connections Inventory (Johnston and Dainton, 1996) to develop personalized learning strategies. This study intended to explore if early educators in a local private school perceive the use and inclusion of the four Learning Patterns in the learning strategies employed by this local literacy programme - 'M-POW'R Programme (Muscat, unpublished) - they are using .

## **Multisensory Techniques - A brief History**

The use of structured multisensory instruction dates back to the late 1930s. Orton's neurological research (Orton, 1937; Hornsby & Shear, 1980) on children struggling to learn how to read led him to identify the condition 'strephosymbolia'; to appreciate the work of Helen Keller and Grace Fernald who were using kinesthetic methods and modalities to reinforce visual and auditory associations; and to build on this concept. Orton proposed the use of all sensory methods and modalities to improve 'weak memory patterns' in teaching reading (Johnson, 1967). Orton's pioneering concept led to the Orton-Gillingham programme, put together by Anne Gillingham at the request of Orton himself. At this early stage, Orton understood the importance of multisensory techniques, the concept of metacognition in learning and to use these techniques when other processes are challenging to the reading situation.

Other programmes then started to be developed, particularly across the United States, such as the Hickey Method (Combley, 2000). Along the years, other structured multisensory programmes were developed. These multisensory programmes all are based on the original concept or the Orton-Gillingham programme (Orton, 1966). Examples of these programmes are Alpha to Omega (Hornsby & Frula, 1980), Bangor Dyslexia System (Miles & Miles 1983), Recipe for Reading (Traub & Bloom, 2000), Wilson Reading System (Wilson, 1996), Beat Dyslexia (Stone, Franks & Nicholson, 2008) and 'M-POW'R (Muscat – still unpublished). Multisensory programmes can be modified according to the specific needs of children. Each of these programmes offers varied tasks and therefore give teachers infinite opportunities and resources to

suit learning preferences, strengths, weaknesses and speed of learning. The key to their success is their multisensory techniques and highly structured format. The three basic principles that underpin a multisensory approach to teaching reading are the use of as many senses as possible, linguistic knowledge and the element of structure involved. A structured multisensory approach helps children acquire knowledge by using their senses simultaneously - hear it, say it, see it, feel it, write it (e.g. Orton 1966; Miles & Miles, 1983; Anders, Hoffman & Duffy, 2000). This technique is simply a teaching strategy which seeks to actively stimulate all available senses simultaneously within a structure and using linguistic knowledge. It is also worth noting that all the programmes above, except for the Muscat programme, were planned for individual or small group teaching as they were geared as intervention programmes for dyslexic students. However, the resources in all the programmes, particularly the programmes published from 1970 onwards, are so varied that they can be adapted for inclusive classrooms teaching.

### **Multisensory Techniques – The most successful techniques to teaching Breaking the Code - An inclusive strategy**

In every classroom, one can say that there is an average of 10-15% of children with possible specific reading difficulties. (Kenig & Wenar, 2000; Bender, 2001). These children benefit from a structured multisensory approach to literacy (Traub & Bloom 2000; Oakland, Black, Stanford, Nussbaum & Balise 1998). There is a whole body of research to conclude that such approaches and techniques are beneficial for all children (e.g. Adams 1990; Mather 1992; Pressley & Rankin 1994; Brady & Moats, 1997). Research findings would lead one to conclude that reading should be taught to all children through a multisensory approach (Falzon, 2010).

How best to teach reading has been the subject of great debate since the latter half of the 20<sup>th</sup> century (Chall, 1967). Earlier research has attempted to establish the nature of effective teaching of literacy by analyzing the processes involved in the reading process and then putting forward a model to guide literacy instruction based on the analysis of these processes. Pioneer researchers such as Chall (1967), Liberman and Schankweiler (1979) and Goodman and Goodman (1979) presented different reading models based on the argument that effective teaching of reading produces effective reading behaviour from the learners. Historically, the problem was that numerous theories of reading were presented separately. The theories can in general be grouped in two distinct categories at the opposing end of a continuum - the Top Down/Inside-Out Approaches, promoting the notion that reading is a highly complex discriminatory process that begins with the brain and ends with selective attention to parts of the printed text; and Bottom-Up/outside-in Approaches where reading is perceived as a process that begins with the verbal visual print of the page and ends with representations inside the brain (Resnick & Weaver, 1979). Both groups of theories acknowledge the importance of different reading skills, but disagree on the

importance given at the level of instruction and reading engagement (Smith and Goodman 1971).

Top-Down/Inside out approaches to reading, were usually supported by psycholinguists such as Smith and Goodman, (1971), who followed a whole language approach. On the other hand, Bottom-Up/Outside- In approaches were generally followed by pedagogues (Elkonin, 1973) and, as the name of the approach implies, embraced the concepts and principles that students must know all the letters before they can read, proposed a hierarchy of skills starting from individual letters to words to meaning, emphasized that decoding needed to be automatized such that decoding does not take up all one's energy at the expense of comprehension. These extreme views are now of course obsolete and have been surpassed by Interactionist models (Chall 1967; Goodman, 1999; Hall & Moats, 1999) and, better still, the Adams' Model to Reading (1990) who in essence values the important of both ends of this continuum and provides very inclusive and comprehensive model.

Research findings show clearly that it is important that a fine balance is created, so that students are exposed both to strategies to decode and to whole language approaches; such that they are stimulated to engage in a range of activities involving literacy and developing positive skills towards literacy and be equipped with the correct skills to address reading techniques (e.g. Adams 1990; Graham & Harris 1994; Moats, 2000; Rose, 2006). Vail (1991) notes:

Recent pressures have forced many administrators and teachers to choose whole language or phonics. This deprived students of the full range of experiences they need and deserve. When adults go to extremes, kids pay the price. One-sided teaching makes a lop-sided offering. In language, structure and texture create and operate within a symbiosis interdependent, each nurtures the other, each needs the other for strength, each compliments the other. Operating together, they form a handclasp of common purpose, an alliance for literacy, a friendship for children (pg. 3-4)

Recent research findings conclude that explicit teaching of lower level skills, coupled with comprehension – upper level skills- instructions, are the most effective, particularly if carried out in the context of other components of reading activities. In other words, effective teaching should be multifaceted, rather than based on the choice of one approach (Adams, 1990; Fisher, Fox & Paille, 1996; Linnea, 2003) and teachers should 'abuse' approaches for the benefit of pupils.

There has been substantial evidence that, with regard to teaching lower level skills of reading, the use of structured multisensory techniques for teaching literacy are one of the best ways to introduce and develop literacy in the classroom (e.g. Hornsby & Shear, 1980; Traub & Bloom 2000; Moats, 2000). Their positive effects are no longer a query any more in the literature. Although multisensory techniques originated from the field of Learning Disabilities/Specific Learning Difficulties (e.g. Thomson 2003; Snowling 2000; Augur 1982; Hornsby & Shear 1980; Orton 1976), its use in the classroom situation is increasingly being appreciated (e.g. O'Connor, Fulmer, Harty & Bell 2005; Joshi, Dahlgren, & Boulware-Gooden 2002; Moats, 2000; NICHD 2000; Adams & Bruck 1995;). Traub and Bloom (2000) claim that teachers using structured multisensory reading programme find the techniques effective when used for

children not only with Specific Learning Disabilities (SpLD) but also with all children, resulting in children learning to spell and read more easily at an earlier age.

Moats (2000) notes that the scientific community has now reached a unanimous agreement that specific difficulties in literacy originate with a 'specific impairment of language processing, not with general visual-perceptual deficits, inability to construct meaning from context or other more general problems with attention and memory' ( pg 1), in other words a core deficit in phonological processing, also linked with the visual verbal input. This implies that there is need for phonological and phonemic awareness of the language structure linked to the verbal visual input that represents these components of the language, in order for one to become an accomplished and effective reader. Moreover, research in early intervention clearly indicates that the degree of awareness and skills in the phonological structure of language is the best predictor to reading success (Lunberg, Olofsson, & Walls, 1980; Elbro, Bornstrom & Peterson, 1998; Mauer & Kamhi, 1996). All research, whether philosophical, theoretical, experimental, empirical, qualitative or clinical, points to the necessity of helping unskilled readers and spellers learn explicit knowledge of language structure, the basic pedagogy used in multisensory approaches (e.g. Orton 1937; O'Connor, Fulmer, Harty and Bell 2005; Schneider and Naslund 1993; Moats 2000; Snowling 2000; Thomson 2003).

With regard to reading, Daniel (1997) reports that in his study dyslexic students following a structured multisensory programme in literacy started to outperform children without dyslexia. Such results are possible because a structured multisensory programme includes the use of phonics, decoding, sight word reading, rule-learning, metacognitive approaches, blended together within a whole language approach (Moats 2000; Hornsby & Shear 1980). It is therefore clear in the literature that the use of multisensory techniques and structured multisensory programmes is conducive to successful reading for all, where the beneficial effects of multisensory teaching are not limited to students who have difficulty with reading (Adams & Bruck 1995; NICHD 2000). Moreover, multisensory techniques to reading also use scaffolding as a principle where the adult models and structures learning experiences as suggested by both Vygotsky and Bruner, as well as the concept or Constructivist concepts as proposed by Piaget and Montessori, where pupils are given the individualized attention needed and the classroom curriculum customized to address particular challenges.

### **The 'M-POW'R Programme (Muscat – Unpublished)**

The 'M-POW'R Programme (Multisensory Programme of Writing and Reading – Pronounced Empower) was developed by Ms Carmen Muscat M. Ed. and is designed to address four to eight year olds. Ms Muscat has over 30 years' experience working with children and adults with dyslexia. As from 1992, she switched from free-lancing to working in an independent school and had the opportunity to use her skills within a school setting. At the time, one of the authors was in the same school responsible

for the 'Support Programme' and the inclusion philosophy of 'At Risk' and skills-based approaches was developing in the school. Ms Muscat was given the responsibility to develop Early Literacy Programme and the 'M-POW'R Programme was created and started being introduced in classes.

The school supported the programme because it saw 'M-POW'R as 'successful for all children' and because the school needed a structured literacy programme. The aims of 'M-POW'R are: (a) success for all - 'catch them before they fail'; (b) addresses an inclusive classroom; (c) 'development for the child as a unique person' (San Anton School Ethos, 1993); (d) use of structure and appropriate and adequate Resources, (e) in-depth awareness of underlying literary skills (Moats 2000); (f) continuity and flow from one grade to another and from school to home (g) continuous teacher support for children experiencing difficulties, and (h) linguistic knowledge necessary for early literacy. The methodology adopted by the school insists that learning has to be a fun experience - learning through games, to use routine, multisensory techniques, memory enhancers, metacognitive skills, self-monitoring skills and parental input and collaboration (Adams, 1990; Berninger et al, 1999; Tod, 1999; International Reading Association, 2001; Spear-Swetling & Bucker, 2004; Rose, 2006). This was incorporated in the 'M-POW'R programme.

This was the start of the programme. Its uniqueness is that it is developed as a programme for classroom teaching and is based on programmes usually designed for individual/small group tuition to children with dyslexia. Muscat developed her programme using her experience teaching dyslexic children, her review of other multisensory programme, and her passion to have whole classes of successful readers, least withdrawal of necessary intervention sessions and continuation of intervention programmes in the classroom. Ms Muscat has not officially published this programme as 'I am always changing resources and developing classroom techniques' and the authors are continuously encouraging her to publish it. 'M-POW'R is a combination of Phonological awareness, whole word approach and synthetic phonics. It also includes a cursive handwriting programme. The 'M-POW'R Programme is based on the principles of structured multisensory techniques to teaching early literacy (Falzon, 2010; Moats, 2000). A 2001 research indicated that teachers at the school perceived this programmes as effective and efficient, and the end result was better and more effective early readers (Falzon & Muscat, 2001). As one Grade 3 teacher noted:

"The teaching techniques, those are beautiful, what she taught us, especially the rules of learning. I have been teaching for 21 years and I have always stressed on reading and spelling - iffissata (I am Obsessed). But I have never had a class that can really make out a work, reasoning, using the rules. Those are beautiful!"

## **The Brain and Mind Connection**

Multisensory programmes are successful because they are respectful of the different learners' pathways for taking in the world and making sense of it. Learners need to

make sense of the world in order to understand and learn. We need to appreciate also that all learners have personalized means for doing so. Johnston (1994, 2002, 2006, & 2009) explains these phenomena through a simple representation explaining how four interactive learning patterns of sequence, precision, technical reasoning and confluence (see Appendix A for a detailed description of the characteristics of each learning pattern). According to Johnston (2009), these patterns act as channeling filters of sensory stimuli. According to this representation, the learning journey begins with the senses which serve as the first line receptors that initiate learning. It is they who gather and channel stimulus into the brain which channels it through its complex series of regions and its neuron-circuitry. Within the brain's electro-chemical processing, the stimulus is "handled" by a number of operations ultimately coming to a point where it meets up with our brain-mind interface where it is filtered by our individual learning processes, *i.e.*, blocked, welcomed, or given limited access to continue on its way to operate within our mind and memory. The stimulus which makes it through the interface is then translated into symbolic representation and passed to our working memory to become a part of our human consciousness (declarative memory) or sub-consciousness (non-declarative memory) (Johnston, 2009; Squire & Zola, 1996).

The Let me Learn Process proposed by Johnston starts by recognizing the central role that these patterns play in forming and operating our learning system. A true understanding of the personalized learning connections of each learner guides learners and teachers how to 'handle' sensory stimuli and make sense of them. Achieving control is the key to learning. Thus, while the literature contends that it is important for all senses to be respected in channeling stimulus into the brain, it is equally crucial to have knowledge of learners' patterned combination to help each learner make sense of the task at hand. This knowledge is also crucial for intentional learners to be able to 'tether' or 'stretch' their learning patterns to make optimal use of their learning potential because, as Johnston puts it 'Finding your way is about taking hold of how you learn and making it work for you so that you can navigate your daily life as well as your future' (Johnston, 2010, p. 10).

## **The Study**

This study intends to explore whether early educators in a local private school perceived the structured multisensory early literacy programme they used ('M-POW'R) as embracing the four learning patterns. The school is an inclusive school within a Parent's Foundation for Education and has adopted a multisensory approach to teaching literacy in the early years based on Adams' model of reading (1990). This reading model was specifically chosen because it respects all reading systems in use, recognizes aspects of the learning reader as well as the accomplished reader, gives importance to all four processes of reading and is in line with neurological functions. More recently, the school also adopted the Let me Learn Programme and so we could analyze both programmes.



## Methodology

A questionnaire approach was employed and the questionnaires were distributed and collected personally by Ms Carmen Muscat. One could have opted for interviewing this small population, but the school and Ms Muscat felt that the teachers would be more receptive to a questionnaire. A copy of the questionnaire is available on request from the authors. A total of nine teachers spread equally over the first three grades of the school participated. These teachers had been teaching at this school using the Muscat 'M-POW'R literacy programme for at least two years. The research question of the study was: 'Do teachers perceive the learning strategies used in the 'M-POW'R Programme (Muscat, unpublished) as respectful of and utilizing the four Learning Patterns? The authors expected the results to indicate that the teachers perceived the 'M-POW'R Programme as inclusive of the four learning patterns. The teachers were not told that the study was linked to the Let me Learn Patterns. In fact, no teacher commented on the connection between the two programmes, even though some of the teachers had been exposed to the Let me Learn Programme, given the school's development plan. Participants were presented with statements which represented the four learning patterns (Table 1). It was felt that this gave the answers more credibility, as no teacher would be biased for or against the Let me Learn patterns. The questionnaire involved close-ended questions using a 5-point Likert scale and reflected the 14 aspects employed in the 'M-POW'R Programme. These 14 themes used are indicated in the results below. For each theme, the teachers had to answer a series of 20 statements. Five statements for each of the four Learning patterns were used (Table 1). For each aspect of the 'M-POW'R Programme, a mean score was computed for every learning pattern by averaging the rating scores elicited for the corresponding statements. The One-Way ANOVA test was used to test whether differences among the mean scores for the learning patterns differed significantly at the 0.05 level of significance. Post hoc pair-wise comparisons were carried out using the Tukey method.

<b>STATEMENT</b>	<b>SPACE TO TICK</b>
Allows children to carry out free activities	<i>CONFLUENCE</i>
Understands the utility and relevance of what they are doing	<i>TECHNICAL</i>
Give space for the child to ask for details	<i>PRECISE</i>
Encourages the student to generate new ideas	<i>CONFLUENT</i>
Respects the concept of sequencing	<i>SEQUENTIAL</i>
Gives children the opportunity to direct their own learning	<i>CONFLUENT</i>
Allows for possibility of self feedback	<i>PRECISE</i>
Gives space for the students' creativity	<i>CONFLUENT</i>
Allow for expression in writing	<i>PRECISE</i>
Allows for precise directions	<i>SEQUENTIAL</i>
Gives space for students to progress at their own rate	<i>PRECISE</i>
Allows the child to combine oral visual and motor movements	<i>TECHNICAL</i>
Provides a safety net for failure and starting again	<i>CONFLUENT</i>
Allows the child to learn step by step	<i>SEQUENTIAL</i>
Uses and refers to the child's real life experiences	<i>TECHNICAL</i>
Helps the child acquire metacognitive skills	<i>PRECISE</i>
Gives time for the child to finish assignments to the full	<i>SEQUENTIAL</i>
Allows the child to work individually	<i>TECHNICAL</i>

Gives importance to presentation	<i>TECHNICAL</i>
Allows for possibility of feedback	<i>SEQUENTIAL</i>

**Table 1:** Statements categorized by the four learning patterns

We would not want to be too forwarding and also classify this research as Grounded theory (Martin & Turner, 1986). Grounded Theory more often than not refers to systematic qualitative research focusing on the generation of theory from data collected. Moreover, Grounded Theory postulates that there needs to be a lack of hypothesis and total openness to results collected. We had developed a hypothesis from related research findings. However, given that such comparative research has to our knowledge never been published, we were able to propose a theory on inclusive learning and strategies based on the research findings.

### **Limitations**

The use of a questionnaire always limits the richness of one-to-one personal contact. As researchers, we were aware that in our choice of data collection, we were forfeiting depth for expediency. We actually hope to be able to develop research in this area using qualitative techniques, where the school would hopefully understand the need for this. Secondly, we were always painfully aware that we needed to be totally objective, given that we are both so enthusiastic about the Let Me Learn Process and the 'M-POW'R Programme and were very careful to interpret the findings as objectively as possible.

### **Reflective Statement**

This study is important to us because, on both a professional and a personal level, we experience the frustrations and sadness of students who, on a daily basis, feel that they are failures in a highly competitive and academic, local educational system. We feel that the celebration of inclusive practices needs to also be evidence-based in order to convince policy makers. This gave us the motivation and energy to conclude the research.

### **Results and Discussion**

These results present teachers' perceptions of the use of the four Learning Patterns in the literacy programme they were implementing in a local private school. This research yielded interesting findings. What is also very relevant is that, even though the research was carried out with a small group of teachers, some results could be generalized since the statistical test used yielded a p-value that is less than the 0.05 criterion. This is also complemented by graphical presentations since some of the

95% confidence intervals for the learning patterns are markedly disjoint. This is a very important inference for both the 'M-POW'R Programme and the four learning patterns (Table 2).

The learning patterns	Mean	Standard. Deviation	Standard. Error	95% Confidence Interval for Mean	
				Lower Bound	Upper Bound
Technical Learning Pattern	4.10	1.280	0.052	4.00	4.20
Sequential Learning Pattern	3.95	1.387	0.057	3.84	4.06
Confluent Learning Pattern	3.86	1.269	0.052	3.76	3.96
Precise Learning Pattern	3.68	1.452	0.059	3.56	3.80

Table 2: Descriptive Statistics table for the 4 learning Patterns using 14 themes

Figure 1 displays that for most themes, technical reasoning pattern was the predominant learning pattern since it had the highest mean rating score. In other words, at any point in time during the programme, it is likely that the Learning Pattern which will be most dominant would be the Technical followed by the Sequential, Confluent, and then by Precise (Table 2). Although the Technical reasoning pattern was the one perceived as most dominant (Mean 4.10), each learning pattern was scored by the participants above the 2.5 threshold (Likert scale ranges from 1 to 5): Precise 3.68, Sequential 3.95, Confluent 3.86. From this, one can infer that participants also saw the relevance of the other three learning patterns in the learning process. One must remember that Breaking the Code to Literacy is a technical skill allowing one to exercise reading with meaning, and it is therefore expected that the technical reasoning pattern would be perceived as the one most used.

We expected the Technical and the Sequential to be high in use, given the nature and aims of the programme. With this reasoning, it is therefore surprising in these results that the Confluent learning pattern was perceived as more dominant than the Precise learning pattern. Even with a skills-based programme, confluence also has a place and students with a high confluent reasoning pattern would also have their needs addressed, such that the mundane task of breaking the code to literacy would be learnt in an interesting, challenging and fun way.

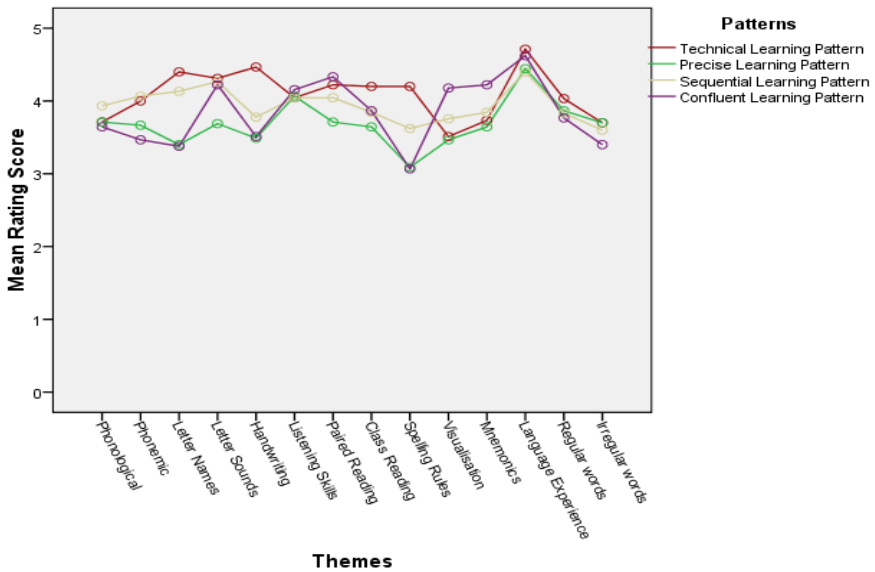


Figure 1: Line graphs displaying mean rating score for each theme categorized by learning pattern

The results (Figure 2, Table 3 and Appendix B) also indicate that for ten out of the 14 themes that there is no significant difference between the mean scores for the four learning patterns. These include phonological awareness, phonemic awareness, listening skills, paired reading, class reading, visualization exercises, mnemonics, language experience, spelling techniques for regular and irregular words. For each of these themes, teacher-participants thought that the techniques reflected, respected and were compatible with the four learning patterns.

Learning Patterns	Mean Difference	P-value
Technical and Precise Learning Pattern	0.202	0.134
Precise and Sequential Learning Pattern	0.160	0.321
Technical and Confluent Learning Pattern	0.002	1.000
Precise and Confluent Learning Pattern	0.200	0.141
Technical and Sequential Learning Pattern	0.043	0.968
Sequential and Confluent Learning Pattern	0.040	0.973

Table 3: Post hoc pair wise comparison of the four learning patterns using Tukey method for the group of 10 themes

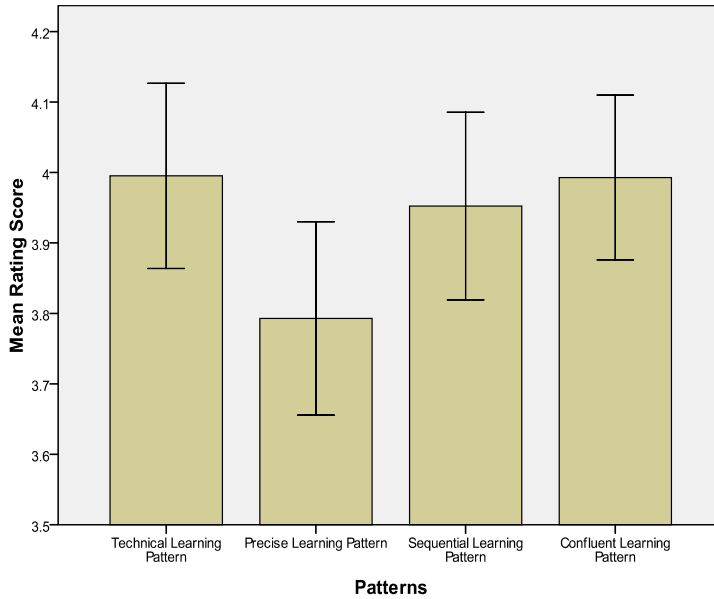


Figure 2: 95% confidence intervals for the mean rating scores elicited for the 4 learning patterns using 10 themes

The four themes where the mean rating scores differed significantly across the four learning patterns are letter names, letter sounds, handwriting and spelling rules (Table 4). As opposed to the other themes, these four themes are finite skills or knowledge. These four skills, rightly enough, tended to lean more towards the Technical learning pattern, as is their nature. With regard to these four themes as a group, the technical reasoning pattern (mean 4.34) had a significantly higher mean rating score, followed by the sequential pattern (mean 3.95); the Confluent (mean 3.54) and the Precise (mean 3.4). Given the nature of the learning and exercises carried out during the learning of these themes, this was not surprising and made sense. For example, there is nothing confluent and precise about learning the name or the sound of a letter: you either know it or you don't. On the other hand, it is a very hands-on practical activity which you learn sequentially until you know all the letter names of the alphabet. There can be nothing confluent about the learning of this fact. Notwithstanding, confluence still scored above the 2.5 threshold.

Themes	Patterns	Mean	Standard Deviation	N	P-value
Letter Names	Technical Learning Pattern	4.40	0.915	45	0.000
	Precise Learning Pattern	3.40	1.483	45	
	Sequential Learning Pattern	4.13	1.455	45	
	Confluent Learning Pattern	3.38	1.466	45	

<b>Letter Sounds</b>	Technical Learning Pattern	4.31	1.019	45	0.020
	Precise Learning Pattern	3.69	1.411	45	
	Sequential Learning Pattern	4.27	0.963	45	
	Confluent Learning Pattern	4.22	0.765	45	
<b>Handwriting</b>	Technical Learning Pattern	4.47	0.815	45	0.000
	Precise Learning Pattern	3.49	1.456	45	
	Sequential Learning Pattern	3.78	1.312	45	
	Confluent Learning Pattern	3.51	1.218	45	
<b>Spelling Rules</b>	Technical Learning Pattern	4.20	1.217	45	0.001
	Precise Learning Pattern	3.09	1.505	45	
	Sequential Learning Pattern	3.62	1.669	45	
	Confluent Learning Pattern	3.07	1.498	45	

**Table 4:** Descriptive statistics table for four themes categorised by the four learning patterns

The Post Hoc test is essential to identify which mean rating score differs significantly from another. The Tukey method was used on the merit that it is more sensitive in detecting differences and also provides homogeneous subsets of the four learning patterns above. Analyzing the four learning patterns pairwise, Table 5 reveals that there is a statistical difference between the Technical and Precise, the Precise and Sequential, and the Technical and the Confluent, the Technical and the Sequential, and the Sequential and the Confluent patterns.

<b>THE FOUR LEARNING PATTERNS</b>	<b>Mean Difference</b>	<b>P-value</b>
Technical and Precise Learning Pattern	0.928	0.000
Precise and Sequential Learning Pattern	0.533	0.001
Technical and Confluent Learning Pattern	0.800	0.000
Precise and Confluent Learning Pattern	0.128	0.791
Technical and Sequential Learning Pattern	0.394	0.023
Sequential and Confluent Learning Pattern	0.406	0.018

**Table 5:** Post hoc pair wise comparison of the 4 learning patterns using Tukey method for four technical themes

Finally, when one compares the mean response of the 14 themes, the ten grouped themes and the four grouped most technical themes (Table 6), one observes that all means remain above the 2.5 threshold and the difference between the lowest score - 3.42 Precise for the group four themes - and the highest score - technical for the group of four themes - is less than 1 (0.92).

Learning Patterns	Mean 14 themes	Mean 10 themes	Mean 4 themes
Technical Learning Pattern	4.10	4.00	<b>4.34</b>
Sequential Learning Pattern	3.95	3.95	3.95
Confluent Learning Pattern	3.86	3.99	3.54
Precise Learning Pattern	3.68	3.79	<b>3.42</b>

**Table 6:** Comparative mean response for the 4 learning patterns using 10 and 14 themes

When comparing the four learning patterns of letter names, letter sounds, spelling rules and handwriting as one group with the 14 themes as a whole using a post hoc pair wise comparison through the Tukey methods, significant differences between the Technical and Precise (<0.005), Precise and Sequential (0.003), and Technical and Confluent (0.010) is observed. On the other hand, no significant difference is indicated between Precise and Confluent ( $p=0.101$ ), Technical and Sequential ( $p=0.226$ ) and Sequential and Confluent ( $p=0.628$ ). When eliminating the four most 'technical' themes of the programme no statistical difference between any pairing of the four learning patterns was yielded.

These results clearly indicate that these teacher perceive the 'M-POW'R Programme as respectful of the four learning patterns and acknowledges the diversity of the students in the classroom. These findings reflect literature and research findings discussed in this paper, with regard to the inclusivity of the use of the four learning patterns and the effectiveness of the 'M-POW'R programme. Literature review does not yield any comparable research to this study, so direct comparisons cannot be made

## Implications for Practice and Research

Several implications for research and practice can be yielded from this study. In the local context, this 'M-POW'R programme has now been adopted by around four schools and most local teachers and children have been exposed to and trained in the Let me Learn Process. A research with all stakeholders involved would therefore be useful. Furthermore, the Let me Learn Process should be researched with others areas of learning such as Mathematics, Science and the Humanities. With regard to practice, the dissemination of this study, as well as qualitative evidence would help increase awareness of the effectiveness of inclusive techniques, where diversity and individual needs are given their due importance (Turnbull et al., 2010).

## Conclusions

Our small study clearly indicates that when learning strategies are inherently inclusive in nature, the chances are that they compliment each other and are beneficial to all

children. The findings clearly indicate that professionals using the Muscat 'M-POW'R Programme perceived the use of the four learning Patterns in the programme and therefore found the programme inclusive and embracing the whole classroom. This is an exciting finding, particularly since the programme focuses on the skills needed to learn how to read and to eventually glean meaning from print effortlessly. Adams (1990) notes that "Deep and thorough knowledge of letters, spelling patterns and words and of phonological translations of all three are of inescapable importance to both skillful reading and its acquisition" (p. 416). The participants in the study perceived this objective fulfilled and found this programme inclusive of the four learning patterns, as well as enjoyable for their pupils. This is a very important finding and proposes a pedagogy theory as a result: programmes embracing Inclusive aims and strategies complement each other, even though developed separately.

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